

Remarks/Arguments:

Claims 1-36 are pending in this Application, where claims 8-9, 19-20 and 23-30 are previously withdrawn. The Applicant appreciates the Examiner's reconsideration of the restriction requirement in light of the Applicant's comments in the paper dated July 28, 2005.

In the Office Action dated October 18, 2005, the Examiner rejected claims 1-2, 10-11, 21 and 31-33 as anticipated by Redilla (US 6420952); rejected claims 1-2, 10-11, and 31-36 as anticipated by Lowther (US 6756656); and rejected claims 3-6, 12-18 and 22 as obvious over Lowther. The Office Action recites that claim 21 rather than claim 22 is rejected as obvious over Lowther, but the text appears to refer to language used in claim 22 rather than claim 21 so that particular obviousness rejection is addressed herein as referring to claim 22.

Whereas the Examiner characterized claim 7 as withdrawn, the Applicant requests reconsideration as the subject matter of claim 7 is similar to that of claim 18 and therefore within the examined species. These remarks consider the rejection to claim 18 as also applying to claim 7 in order to address what appears to be an oversight in the Office Action.

Since Lowther is applied against the majority of claims, those rejections are considered first. The Examiner describes Lowther as disclosing a balun transformer in an integrated circuit having a first metal layer forming a first coil 310, a second metal layer forming a second coil 316, and a third conductive shielding layer 312A, 312B disposed therebetween and connected to ground. The Office Action thereafter includes an incomplete sentence (ending with "formed of") to which the Applicant cannot reasonably respond, so the anticipation rejections to some claims over Lowther are not fully supported in the Office Action.

Regardless, the above characterization of Lowther is seen to be error. Whereas Lowther does describe reference number 316 as conductive turns, reference number 310 is disclosed to be contacts that directly couple the ribs 312A, 312B (which the Examiner considers analogous to the shielding layer) to a shield section 304A, 304B. At col. 3 lines 41-44, it is described that conductive ribs coupled to a shield section are positioned between conductive turns and the shield layer, not between layers of conductive turns. Lowther is not seen to provide two

distinct layers of conductive turns or windings, and therefore cannot dispose a shield layer between them as in each independent claim. This view is consistent among all the Lowther cross-sectional views. At prior art Figure 1A, the shield sections 56A, 56B lie between one layer of conductive turns 60 and a substrate 52; at prior art Figure 1B, the shield sections 74A, 74B lie between one layer of conductive turns 80 and a substrate 72; at Figure 2C, the shield tap 208 and ribs 206 lie between the single layer of conductive turns 202 and what the Applicant asserts is an unillustrated substrate (lying underneath the sectional lines A-B, C-D and E-F of Figures 2A-2C respectively); and at Figure 3F the ribs 312A, 312B and shield sections 304A, 304B lie between the single layer of conductive turns 316 and the lossy substrate 302.

The embodiments of Lowther are seen as consistent with those described as prior art at page 2 lines 2-6 of the Application. The purpose of the ground shields described there is stated to prevent noise coupling from a conductive substrate (e.g., bulk silicon) and to increase Q factor by reducing lossy ground capacitance. Lowther's embodiments are seen to be in the context of a bulk lossy substrate (ref. no. 302 and col. 1 lines 44-50), and increasing Q factor by reducing parasitic resistance and capacitance due to that lossy substrate (col. 1 lines 32-41). While Lowther does describe that the conductive turns may be in multiple layers (col. 1 lines 29-30), nowhere does Lowther describe shielding between layers of conductive turns. This is because Lowther is seen as being directed toward shielding coupling between a layer of conductive turns (or multiple layers of them) and the substrate itself.

In contradistinction, each of independent claims 1, 11 and 31 recite in varying language that the first/primary coil (on the first layer) is magnetically coupled to the second/secondary coil (on the second layer) through the third layer interposed between the first and second layer which defines the electric shield. Lowther does not so interpose a shield layer but rather interposes shielding between a layer of conductive turns and a bulk substrate.

Dependent claims 2 and 36 each recite that the third layer further bears metallization for coupling together at least two components of the IC/RFIC, as does independent claim 11. This claim element is enabled in Figure 13 at reference numbers 27, and the associated text at page 10 lines 18-22. No support is given in the Office Action for teachings in Lowther that may render this claim element anticipated, and none is seen. Neither is support given for

teachings in Lowther that the electric shield functions to improve symmetry of a balanced transformer as in claim 34, and again none is seen.

The Office Action contends that each of claims 3-6, 12-18, and 22 (assumed though the latter is written as claim 21, see above) are obvious design considerations in view of Lowther for the purpose of providing better shielding. No support is given for this assertion which is seen to be conclusory and driven by improper hindsight. Lowther is not seen to disclose any functional relation between ribbon width, adjacent ribbon spacing, layer distance, skin depth or signal frequency as in claims 3-5 or 12-16. Further, Lowther is not seen to describe connecting ribbon structures together at one center point that carries the ground potential as in claims 7 and 18; the "X" structure of Lowther's Figure 6 is not described as coupled to ground at the center. The Applicant requests that the Examiner either take official notice of the material in these dependent claims, cite a specific prior art source, or withdraw the rejections.

The Examiner has further rejected claims 1-2, 10-11, 21 and 31-33 as anticipated by Redilla. Of these, claims 1, 11 and 31 are independent. Redilla is directed to a transformer 6 wherein primary and secondary windings 4 and 5 are each disposed on a separate printed circuit board 2, with a Faraday shield 1 disposed therebetween (col. 2 lines 37-45). Note that Figure 1 of Redilla does not include reference number 5; the Applicant considers either pair of reference numbers 4 above or below the shield 1 (but not both pairs) as the secondary winding 5. A core 3 is disposed about the circuit boards 2 and penetrates a central hole 1c in each of the Redilla embodiments (col. 2 line 66 to col. 3 line 2, Figures 1-2 and 4) and also in the Redilla-disclosed prior art (Figure 3). Redilla does not detail the core 3 with particularity, but the proximal arrangement of components places the core 3 in a position to effect electromagnetic coupling between the primary and secondary windings 4 and 5. Such an arrangement is consistent with that shown as prior art in the Application at Figure 1A.

Claims 1, 11 and 31 each recite in varying language that the first/primary coil (on the first layer) is magnetically coupled to the second/secondary coil (on the second layer) *through* the third layer which defines the electric shield. In Redilla, electromagnetic coupling between the primary and secondary windings 4 and 5 appears to be via the core 3, which does not lie between those windings or between the circuit boards 2 that carry them. Such a magnetic

coupling is not analogous to that recited in claims 1, 11 and 31, and Redilla does not disclose that magnetic coupling between the primary and secondary windings 4 and 5 is through the Faraday shield 1.

Further, claim 1 recites "An integrated circuit" (IC), and claims 11 and 31 each recite "A radio frequency integrated circuit (RFIC)". In an IC or RFIC as in claims 1, 11 and 31, a magnetic core 3 such as that illustrated in Redilla is not seen to be possible with conventional (layered) IC fabrication techniques known to the Applicant. Because the core 3 of Redilla is understood to effect electromagnetic coupling between windings 4 and 5, it is not obvious to modify Redilla by removing that core 3 because to do so would change its principle of operation.

The distinction between an IC based transformer and one disposed among multiple printed circuit boards is not arbitrary. For example, the Application describes at page 9 lines 14-18 that the ribbons of the electric shield may be about 1 micron, whereas the Applicant understands that current printed circuit board technology such as would be used to fabricate Redilla's transformer enables a typical minimum width of a planar conductor at about 50 microns. The related disclosure at page 9 lines 6-12 concerns both general guidelines and a ribbon width preference. A 50 micron ribbon width appears incapable of satisfying either.

Claim 11 further recites, as does dependent claim 2, that the third layer further bears other metallization for coupling together at least two components of the IC/RFIC. This claim element is enabled in Figure 13 at reference numbers 27, and the associated text at page 10 lines 18-22. No support is given for the assertion in the Office Action that Redilla's shielding layer is "adapted for coupling together with other components", and none is seen. Redilla is not seen to disclose in text or illustration adaptations similar to the wiring 27 within the layer 25 of the Applicant's Figure 13, which in Redilla would lie within the shield 1 or separate layer that carries that shield 1.

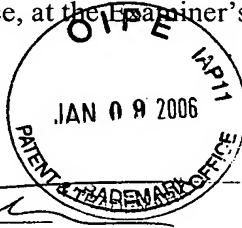
The Applicant respectfully requests that the Examiner review the cited art in view of the above comments. It is believed that the claims presented herein, unchanged from those claims previously presented, patentably distinguish over the references and are in condition

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for allowance. The undersigned welcomes the opportunity to resolve or clarify any remaining matters via teleconference, at the Examiner's discretion.

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